Space Weather Forecast

Issued on Friday, 17 December 2021 at 01:05 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Daily chance of moderate-class X-ray flares and radio blackouts, potentially increasing.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar Activity was Low in the past 24 hours, with a gradual increase in background flare activity and C-class flares becoming more regular, the largest being an impulsive C3 at 15/1527UTC. This flare emanated from a complex group of sunspot regions located in the southeast quadrant, two of which are classified as Dai/Beta-Gamma, having undergone rapid development. There are seven sunspot groups on the disc at present.
No Earth-directed Coronal Mass Ejections (CMEs) were observed in available satellite imagery for the period, although several large peripheral eastern horizon events were noted, as well as very faint and narrow west limb occurrences.

Solar Wind / Geomagnetic Activity: Earth is currently sampling the fast wind from a 'coronal hole'. This solar wind speed was stable and elevated initially but recently declined, while the number of particles and their associated magnetic field both saw slight declines towards background levels. The net result of these solar wind measures was mostly quiet geomagnetic activity, well below Minor Geomagnetic Storm G1 throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed in the period.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar Activity is currently Low but may become Moderate at any time, given the complexity of the sunspot regions present on the eastern hemisphere. Further potential regions are also expected to arrive over the eastern limb later in the period, while none should leave, meaning the risk of significant flares ought to increase over the coming weekend, with an increasing chance of M-class flares and a slight chance of X-class events. For now, common-class flares are expected, with a daily 90% chance, while there is a 30% chance of moderate and 5% for strong events.

Solar Wind / Geomagnetic Activity: No CMEs feature in the current forecast period. Earth is currently under the influence of a coronal hole and may remain connected to its high speed stream for another two days, before its influence starts to wane on days 3 and 4. Geomagnetic activity is expected to be mainly Quiet to Unsettled but with a chance of Active intervals, should we observe any faster solar winds on Days 1 and 2.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, although there is a slight increasing risk with time as the active regions migrate westward towards the western hemisphere - a position more likely to affect Earth with solar radiation storms, should they flare significantly.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	5	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	30	30	40	40
Very Active	R3 to R5 X	No	5	5	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	2	3	4	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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